Computational Biomechanics of Soft Tissue for Bone Remodelling

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It is unclear whether soft tissue plays a role in affecting surrounding bone remodelling. This study aimed to determine how mucosa thickness influences residual ridge resorption as a consequence of wearing implant-retained overdentures over two years. The cone beam computerized tomography (CBCT) was used for quantifying the bone level before and two-year after denture treatment for 6 patients. A clear correlation ($R^2 = 0.7$) between mucosa thickness and residual ridge resorption was determined. Based on the CT images, the finite element models were created to quantify the mucosa biomechanical roles. Linear elastic and viscoelastic material models were considered for soft tissue (mucosa). It is found that hydrostatic pressure level at different mucosa thickness is relevant to corresponding bone resorption. The clinical and computational biomechanical findings agree surprisingly well and the findings provide a clue for developing new bone remodeling rule.

Keywords: Soft Tissue, Bone Remodeling, Implant, Overdenture, Finite Element